PATENT
03466-P0001B WWW/SBS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re The Application Of Hans-Wulf Pfeiffer Serial No.: 09/929,267 Filed: August 14, 2001 For: Method Of Increasing The Boundary Layer Strength On Surfaces Of Workpieces Made Of Brittle Hard Materials	Examiner: John Hoffmann Group Art Unit: 1731

Substitute Appeal Brief Under 37 C.F.R. §41.37

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Having filed herewith a Notice of Appeal from the final rejection of Claims 1-18, all of the claims currently pending, the final rejection being mailed on January 8, 2007, Appellant submits its Appeal Brief for the above-captioned application.

(I) Real Party in Interest

The real party in interest is Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung residing at Hansastrasse 27c; D-80686 Muenchen, Germany.

(II) Related Appeals and Interferences

There are no related appeals, interferences or judicial proceedings known to Appellant, the Appellant's legal representative, or Assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(III) Status Of Claims

Claims 1-18 are currently pending, stand rejected and are the subject of the instant Appeal. Claim 19 is cancelled.

(IV) Status Of Amendments

There are no pending or unentered Amendments.

(V) Summary Of Claimed Subject Matter

Claim 1

Claim 1 is directed to a method for increasing the boundary layer strength of a workpiece consisting of ceramic and does not comprise zirconia.

(p. 7, lines 5-19, p. 8, lines 4-9) A workpiece that consists of ceramic is provided at room temperature. (p. 7, lines 11-25, p. 8, line 10 – p. 9, line 5) Also provided is a tool that has a partially rounded contour and has at least the same order of hardness as the workpiece. (p. 7, lines 11-25, p. 8, lines 4-9, p. 9, lines 17-28) The tool has a diameter ranging from about .1 mm to about 4 mm. (p. 9, lines 17-28) The workpiece is then contacted by the tool within a defined surface area that is less than the total surface area of the workpiece. (p. 7, lines 11-25, p. 8, lines 4-9, p. 9, lines 6-10) A plastic deformation is produced in the contacted area that in turn generates internal compressive strain in the vicinity of the contacted area. (p. 7, lines 11-19, p. 8, lines 4-9, p. 8, line 21 – p. 9, line 5, p. 10, lines 1-13, p. 10, line 28 – p. 11, line 4) The internal compressive strain is generated such that brittle fracture of the workpiece is substantially avoided and the boundary layer strength of the ceramic workpice is increased. (p. 7, lines 5-10, p. 8, line 10 – p. 9, line 5, p. 9, line 17 – p. 10, line 27)

Claim 10

Claim 10 is directed to a method for increasing the boundary layer strength of a workpiece consisting of ceramic. (p. 7, lines 5-19, p. 8, lines 4-9) A workpiece that consists of ceramic is provided at room temperature. (p. 7, lines 11-25, p. 8, line 10 – p. 9, line 5) A tool is provided that has a predetermined diameter ranging from about .1 mm to about 4 mm, a partially rounded contour and has at least the same order of hardness as the workpiece. (p. 7, lines 11-25, p. 8, lines 4-9, p. 9, lines 17-28) The workpiece is then contacted by the tool within a defined surface area that is less than the

total surface area of the workpiece. (p. 7, lines 11-25, p. 8, lines 4-9, p. 9, lines 6-10) A plastic deformation is produced in the contacted area that in turn generates internal compressive strain in the vicinity of the contacted area. (p. 7, lines 11-19, p. 8, lines 4-9, p. 8, line 21 – p. 9, line 5, p. 10, lines 1-13, p. 10, line 28 – p. 11, line 4) The internal compressive strain is generated such that brittle fracture of the workpiece is substantially avoided and the boundary layer strength of the ceramic workpiece is increased. (p. 7, lines 5-10, p. 8, line 10 – p. 9, line 5, p. 9, line 17 – p. 10, line 27)

(VI) Grounds Of Rejection To Be Reviewed On Appeal

Claims 1 – 18 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement.

Claims 1 – 18 stand rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,128,083 to Brookes ("Brookes") in view of U.S. Patent No. 3,573,023 to Thomas et al. ("Thomas"), further in view of U.S. Patent No. 6,153,023 to Rokutanda et al. ("Rokutanda"), and further in view of the Abstract of JP 04108675 ("the JP Abstract").

Claims 1 – 18 further stand rejected under 35 U.S.C. §103 as being unpatentable over Brookes, Thomas, or JP Abstract in view of U.S. Patent No. 5,228,245 to Rice et al. ("Rice").

(VII) Argument

The Examiner's rejection under 35 U.S.C. § 112, first paragraph is improper because Appellant has addressed each of the issued raised and provided or alternately specifically directed the Examiner's attention to portions of the written

specification, which provide the support for the pending claims. The Examiner's rejections under 35 U.S.C. § 103(a) are also improper because neither Brookes, Thomas, Rokutanda, the JP Abstract or Rice discloses, teaches or suggests all of the limitations of independent Claims 1 and 10. For example, Claim 1 requires, in part,

> providing a workpiece consisting of ceramic, the temperature of which is not elevated above room temperature and which does not comprise zirconia,
>
> providing a tool having a diameter that does not exceed a range from about .1 mm to about 4 mm and is at least the same order of hardness as the ceramic workpiece,
>
> contacting the ceramic workpiece with the tool within a predetermined surface area,
>
> generating internal compressive strain within the ceramic workpiece in the vicinity of the predetermined surface area,
>
> wherein generation of damage in the form of brittle fracture processes in the predetermined surface area is substantially avoided and the boundary layer strength of the ceramic workpiece is increased.

(p. 12, Claim 1) (emphasis added). Alternatively, Claim 10 requires, in part,

> contacting the workpiece consisting of ceramic in which, the temperature has not been elevated above room temperature and does not comprise zirconia, with a tool having a predetermined diameter and has at least a partially rounded contour within a predetermined surface area, the tool comprising at least the same order of hardness as the ceramic workpiece, said predetermined surface area being less than the total surface area of the ceramic workpiece and being selected based upon the composition of the workpiece;
>
> wherein the predetermined diameter for the round contour tool does not exceed a critical value ranging from about .1 mm to about 4 mm, the critical value depending upon the composition of the ceramic workpiece selected

> such that upon contacting the ceramic workpiece with the round contour tool, generation of damage in the form of brittle fracture processes in the predetermined surface is substantially avoided and the boundary layer strength of the ceramic workpiece is increased.

(p. 13, Claim 10). In fact, the references themselves specifically teach away from the suggested modification and combination. A fair reading of the disclosures of the cited references simply does not disclose or suggest the claimed invention.

Rejection of claims 1-18 under 35 U.S.C. § 112, First Paragraph

The Examiner discussed eight factors in determining whether there is sufficient evidence to support a determination that the disclosure does not satisfy the enablement requirement including:

> (A) the breadth of the claims;
> (B) the nature of the invention;
> (C) the state of the prior art;
> (D) the level of one of ordinary skill;
> (E) the level of predictability in the art;
> (F) the amount of direction provided by the inventor;
> (G) the existence of working examples; and
> (H) the quantity of experimentation needed to make or use the invention based on the content of the disclosure.

(A) All the claims of the present invention are limited to a workpiece consisting of ceramic. The Examiner however has stated that even though the claims require a workpiece consisting of ceramic that the claims also cover workpieces comprising "ceramets, carbon compsites, etc." (Official Action 3/29/05, p. 3). The Examiner has further submitted that he "does not agree with applicant's position that the claims are limited to "true ceramics" (whatever that would mean)." *Id.* The Examiner has still further submitted that because the claims are presented as a method "comprising the steps of" format, that the claims are open to additional

steps, which could include the step of "adding a non-ceramic feature thereto, then providing a tool, etc." (Official Action 3/29/05, p. 5). Appellant respectfully disagrees.

Appellant respectfully submits that the claims are limited to workpieces made solely of ceramic (such as silicon nitrides) and do not cover various composite materials as suggested by the Examiner, such as cermets or cemented carbides. *See e.g.* Specification paragraphs 4, 25, and 31. While Claims 1 and 10 both require the limitation of providing a "workpiece consisting of ceramic", the Examiner has ignored the further limitations of Claims 1 and 10, which also require "providing a tool which has . . . the same order of hardness as the ceramic workpiece", "contacting the ceramic workpiece with the tool", "generating internal compressive strain within the ceramic workpiece", and "wherein . . . upon contacting the ceramic workpiece with the tool, generation of damage in the form of brittle fracture processes in the predetermined surface area is substantially avoided and the boundary layer strength of the ceramic workpiece is increased." (emphasis added) All of these steps require use of a ceramic workpiece, which is claimed as a "workpiece consisting of ceramic." There is no opportunity to insert a non-ceramic material insertion step as suggested by the Examiner.

The Examiner has further submitted that he does not know what a "true ceramic" is. (Official Action 3/29/05, p. 3). Appellant respectfully submits that the terms "true ceramics" and "near ceramics" are terms used and understood by those of skill in the art. For example, these terms are used in Thomas where, in differentiating "ceramics" from "near ceramics" Thomas teaches that "we suggest these – materials comprising tungsten carbide, boron carbide, aluminum oxide, or magnesium oxide – to encompass both the near ceramics and the true ceramics."

(col. 3, lines 52-55). Thomas further teaches that "the type of material undertaken for treatment will dictate use of either the basic method of our invention, or the temperature-controlled method of our invention. For the mechanical deformation of materials comprising tungsten carbide can be carried out at normal room temperatures. Materials comprising aluminum oxide, however, require surface deformation in an elevated-temperature environment." (col. 3, lines 58-65). Further clarifying the difference between near ceramics and true ceramics, Thomas itemizes workpieces as follows: "cemented carbides, e.g., tungsten carbide, or boron carbide", and true ceramics "those comprising aluminum oxides, or magnesium oxides."(col. 1, lines 43-45). Appellant therefore respectfully submits that despite the fact that the Examiner does not know what true ceramics are, this term is used by and is well known in industry by those of skill in the art as evidenced the clear usage in Thomas.

Appellant still further notes that as stated in Appellant's declaration, the term "ceramic" "does not include non or near ceramic materials compositions such as for instance, cermets and cemented carbides" (Attached as Exhibit A, Declaration of Mr. Hans Wulf Pfeiffer dated 3/9/04) as suggested by the Examiner. The Examiner arguments appear to ignore the common usage of terms used in industry and simply dismisses Appellant's Declaration as to the breadth of the term "ceramic." However, Appellant respectfully submits that the term ceramic has been clearly defined to exclude "ceramets, carbon compsites, etc." as suggested by the Examiner.

(B) The Examiner has stated that the nature of the invention does not lend itself as evidence to show the invention is enabled. (Official Action 3/29/05, p. 3). Appellant notes that the detailed description discloses specifics relating to the method as claimed including the results from experimentation including for example:

par. 25, "an increase of the boundary layer strength of 15% could be achieved"; par. 27, "plastic deformation is restricted to a predetermined laterally narrowly limited surface area"; par. 27, "the tool . . . must be rated as non-sharp-edged"; par. 29, "critical values for the sphere diameter range from about .1 mm to a maximum of 4 mm"; par. 31, "For determining process parameters required for successful operation preferably two preliminary experiments must be performed: on a plate of the material to be treated the dependence of the compression yielding point and brittle fracture limit on the tool geometry is determined. To this end the static ball thrust test is employed"; (Par. 31), "A material having at least the same hardness as the workpiece to be treated is selected as tool material" and that the "preliminary experiment furnishes the required tool geometry and the admissible amount of momentum to be introduced."

Accordingly, Appellant respectfully submits that all steps and requirements as claims are described so as to show the invention is enabled.

(C) The Examiner has submitted that the state of the art is that applicant's invention cannot be done. Appellant agrees with the Examiner that the prior art, including that cited by the Examiner against the present claims, has failed to achieve the desired result of increasing the boundary layer strength of workpieces made solely of ceramic without first increasing the temperature of the workpiece substantially above room temperature. Applicant notes however, that the fact that others have not been able to solve this long standing and vexing problem in the industry is not evidence that Appellant's method disclosed and taught in the specification does not achieve the results described therein. Rather, as stated in the specification "[i]t was possible, for instance, to demonstrate that a

workpiece made of silicon nitrite could be processed by plastic deformation on its surface with application of shot-peening methods in such a way that an increase of the boundary layer strength of 15% could be achieved." (par. 25). Appellant has specifically stated the beneficial results that may be obtained in following the steps outlined in the specification. The Examiner appears to simply ignore these results or may simply not believe the submission in the specification. Either case is not evidence that the claimed process will not achieved the specific results taught in the specification.

(F) The Examiner has submitted that the "amount of direction provided by the inventor is low" and that there "is no indication or suggestion as to what ceramics might work or what amount of force is needed to get the strengthening effect." (Official Action 3/29/05 p. 4). Appellant again respectfully disagrees. As stated above in sections (A) and (B), the material of the workpiece is limited to a ceramic and does not include composite materials such as cermets and cemented carbides. In addition, the specification teaches that a "static ball thrust test" is to be employed to in part, achieve the desired strengthening results as previously referenced above (Par. 31).

(H) The Examiner has further submitted that the "prior art indicates the invention would not work." (See response to (C) above).

Appellant respectfully submits that static ball thrust tests are well known in the art, however, the novel combination of the specific steps taught in the specification provide the "unforseen finding that an increase of the boundary layer strength by mechanical treatment on the surface is possible on brittle, hard materials, without the necessity of elevating the temperature of the brittle, hard material." (par. 25).

Accordingly, Appellant respectfully submits that the specification does enable one of ordinary skill in the art to practice and achieve the results disclosed in the specification without undue experimentation.

Argument Regarding All Rejections of claims 1-18 under 35 U.S.C. § 103(a)

All the claims of the present application require, among other steps, providing a workpiece consisting of ceramic, the temperature of which is not elevated above room temperature and which does not comprise zirconia, providing a tool having a diameter that does not exceed a range from about .1 mm to about 4 mm and is at least the same order of hardness as the ceramic workpiece, contacting the ceramic workpiece with the tool within a predetermined surface area, generating internal compressive strain within the ceramic workpiece in the vicinity of the predetermined surface area where generation of damage in the form of brittle fracture processes in the predetermined surface area is substantially avoided and the boundary layer strength of the ceramic workpiece is increased.

The Examiner has submitted that the "language that the workpiece is "consisting of ceramic . . . is met because the relevant references disclose that the item is a ceramic material." (Official Action 3/29/05 p. 5). Appellant admits that Thomas teaches use of true ceramics, however, Thomas fails to teach impacting a true ceramic without first elevating the temperature of the ceramic workpiece. Thomas specifically teaches that "the type of material undertaken for treatment will dictate use of either the basic method [non-elevated temperature method] of our invention, or the temperature-controlled method [elevated temperature method] of our invention. For the mechanical deformation of materials comprising tungsten

carbide [cermets] can be carried out at normal room temperatures. Materials comprising aluminum oxide [ceramics], however, require surface deformation in an elevated-temperature environment." (col. 3, lines 58-65)(emphasis added). Therefore, Appellant agrees with the Examiner that Thomas teaches use of ceramics, however, Thomas specifically teaches that ceramics (i.e. aluminum oxide) must be elevated in temperature prior to treatment.

In differentiating "ceramics" from "near ceramics" Thomas teaches that "we suggest these – materials comprising tungsten carbide, boron carbide, aluminum oxide, or magnesium oxide – to encompass both the near ceramics and the true ceramics." (col. 3, lines 52-55). Thomas further differentiates ceramics from cermets and cemented carbides where it itemizes work pieces comprising "cemented carbides, e.g., tungsten carbide, or boron carbide", and ceramics including "those comprising aluminum oxides, or magnesium oxides." (col. 1, lines 43-45). Therefore, Thomas teaches that the true ceramics (i.e. aluminum oxide, magnesium oxide, etc.) require treatment at an elevated temperature, while the near ceramics also called the cemented carbides (i.e. tungsten carbide, boron carbide) may be treated at room temperature.

It is well settled that if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). In this case, Thomas directly teaches that the Examiner's proposed modification cannot be done with a ceramic and with the method taught in Thomas without first elevating the temperature. Accordingly, such a modification of the Thomas method cannot be obvious.

With regard to Brookes, Appellant respectfully submits that the specification describes some general principles of the process stating that "[i]t has been found that the principle variables which have to be controlled during treatment of a hard engineering ceramics material in accordance with the process of the present invention to achieve the benefits ascribed above are as follows: ... 2. The temperature at which the process is carried out must be less than that at which adhesion and seizure would occur between the surface of the hard engineering ceramics material being treated and the second material applying the point/line loading through processes of bulk diffusion yet high enough to enable significant dislocation mobility. This will usually be in the range of 0.3 Tm to 0.5 Tm", where the bottom end (0.3 Tm) is approximately 420°C. (Col. 2, lines 16-20 and 26-33) (emphasis added). Further reading of Brookes points out that certain "principle variables . . . have to be controlled" and that while the temperature may vary, the range is 420°C to 700°C. (emphasis added). Therefore, Brookes also teaches that ceramics must be elevated significantly in temperature prior to mechanical deformation.

Accordingly, no combination of these references can result in a method where a workpiece consisting of ceramic, the temperature of which is not elevated above room temperature and which does not comprise zirconia, may be impacted to increase the boundary layer strength of the ceramic workpiece as required by all of the pending claims.

Rejection of claims 1-18 under 35 U.S.C. §103(a) over Brookes in view of Thomas in view of Rokutanda and further in view of JP Abstract

In view of the above arguments, Appellant further submits that Rokutanda is not directed toward hardening of ceramic workpieces, but rather teaches a method

for "projecting shot on the hardened surface of the hard metal product." (Abstract). Rokutanda is not directed toward a method for impacting ceramic workpieces as required by all the pending claims, but rather is directed toward hardening metal products. Therefore, Appellant therefore respectfully submits that Rokutanda cannot be used to teach or suggest impacting a ceramic which is not elevated above room temperature as required by all pending claims.

Likewise, the JP Abstract is entitled "Ceramic-Metal Joined Structure" and is described as a "joined structure of a ceramic component and a metal component." (JP translation provided by Examiner, at p.3). The JP Abstract further states that "[s]ince the ceramics are inherently brittle materials, however, it is difficult to use them alone, and it is more rational to rely on a method wherein a ceramic is used only in a site that must meet a performance requirement base on its combination with another material." (JP translation, p. 4). Therefore, the JP Abstract specifically teaches that a cermet must be used as true ceramics are too brittle. Accordingly, Appellant respectfully submits that Rokutanda cannot be used to teach or suggest impacting a ceramic which is not elevated above room temperature as required by all pending claims.

It is well settled that the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). In this case, there is no suggestion for combining Rokutanda or the JP Abstract with either Brookes or Thomas as suggested by the Examiner, but in fact, they teach away from the combination, and therefore an obviousness rejection is inappropriate.

Based on the foregoing, because none of the above-listed prior art teaches, discloses, or suggests, providing a workpiece consisting of ceramic, the temperature of which is not elevated above room temperature and which does not comprise zirconia, providing a tool having a diameter that does not exceed a range from about .1 mm to about 4 mm and is at least the same order of hardness as the ceramic workpiece, contacting the ceramic workpiece with the tool within a predetermined surface area, generating internal compressive strain within the ceramic workpiece in the vicinity of the predetermined surface area where generation of damage in the form of brittle fracture processes in the predetermined surface area is substantially avoided and the boundary layer strength of the ceramic workpiece is increased, as required by the claims, none of the cited references can render any of the claims obvious.

Appellant further respectfully submits that it would not be obvious to further modify Brookes, Thomas, Rokutanda or the JP Abstract to include the limitation of not elevating the ceramic workpiece above room temperature because at least both Brookes and Thomas specifically teach otherwise, while neither Rokutanda nor JP Abstract comment on the use of true ceramics.

Rejection of claims 1-18 under 35 U.S.C. §103(a) over Brookes, Thomas or JP Abstract in view of Rice

In view of the above arguments, Appellant further submits that the Rice specification teaches "[t]ransformation toughening of ceramics is most well known in bodies containing metastable tetragonal zirconia particles" and goes on to teach a method for hardening a ceramic comprising "partially stabilized zirconia (PSZ)" (Col. 1, lines 13-15 & 30-31), or "tetragonal zirconia ... referred to a 'TZP'" (Col. 1, lines 35 and 38-39), or "zirconia-toughened alumina (ZTA)." (Col. 1, lines 44-45.)

Additionally, all of the examples listed in the specification of toughening a workpiece include use of zirconia (*See e.g.* Col. 3, lines 39-46 and 62-64; Col. 4 lines 3-7 and 16-17). Accordingly, Appellant respectfully submits that the method taught in Rice includes zirconia in each case and will not work for ceramics at room temperature unless they contain zirconia. Therefore, Rice fails to teach impacting a ceramic that does not comprise zirconia which is not elevated above room temperature as required by all of the pending claims.

Appellant further respectfully submits that it would not be obvious to further modify Brookes, Thomas, the JP Abstract or Rice to include the limitation of not elevating the ceramic workpiece above room temperature because at least both Brookes and Thomas specifically teach otherwise, while the JP Abstract teaches use of a ceramic-metal joined structure rather than only a true ceramic, and Rice specifically teaches that zirconia must be used with ceramic.

Moreover, Appellant respectfully submits that the above-listed references are not properly combined in order to formulate an obviousness rejection. There is no suggestion to combine the cited prior art and in fact, the references themselves teach away from the suggested combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990).

For example, the claims require that the ceramic not comprise zirconia, however, whereas Rice teaches methods that must use zirconia. It cannot be obvious pick and choose specific features or limitations out of various references to formulate and obviousness type rejection, while at the same time ignoring the primary teachings of the reference itself. *See Ex parte Beuther*, 71 U.S.P.Q.2d 1313, 1316 (BdPatApp&Int 2003) (unpublished).

Accordingly, Appellant respectfully submits that modification of the references as suggested by the examiner cannot be obvious as the references themselves specifically teach away from the suggested modification.

Respectfully submitted,

March 23, 2007

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(VIII) Claims Appendix

1. (previously presented) A method for increasing a boundary layer strength of a ceramic workpiece comprising the steps of:

providing a workpiece consisting of ceramic, the temperature of which is not elevated above room temperature and which does not comprise zirconia;

providing a tool which has at least a partially rounded contour with a predetermined diameter, the tool comprising at least the same order of hardness as the ceramic workpiece;

contacting the ceramic workpiece with the tool within a predetermined surface area, said predetermined surface area being less than the total surface area of the ceramic workpiece and being selected based upon the composition of the workpiece;

producing a plastic deformation on the predetermined surface area; and

generating internal compressive strain within the ceramic workpiece in the vicinity of the predetermined surface area;

wherein the predetermined diameter for the tool does not exceed a critical value ranging from about .1 mm to about 4 mm, the critical value depending upon the composition of the ceramic workpiece selected such that, upon contacting the ceramic workpiece with the tool, generation of damage in the

form of brittle fracture processes in the predetermined surface area is substantially avoided and the boundary layer strength of the ceramic workpiece is increased.

2. (previously presented) The method of claim 1 wherein the critical value ranges from about .1 mm to about 1 mm.

3. (previously presented) The method of claim 1 wherein the tool has an inherent momentum and is directed onto the ceramic workpiece surface at rest, on which the boundary layer of the ceramic workpiece is deformed by introduction of the momentum of the tool.

4. (previously presented) The method of claim 1 wherein the ceramic workpiece surface is subjected to plastic deformation in a plurality of predetermined surface areas over the surface of the ceramic workpiece by repeated blows of the tool or by the application of a plurality of tools acting upon the ceramic workpiece surface.

5. (previously presented) The method of claim 1 wherein the tool comprises at least one sphere, which is driven onto the ceramic workpiece surface by means of

a blasting installation, operated on compressed air or on an airless blasting means.

6. (previously presented) The method of claim 5 wherein the material of the sphere comprises the same or a similar material as that of the ceramic workpiece to be machined on its surface.

7. (original) The method of claim 1 wherein the tool comprises a hammer.

8. (original) The method of claim 1 wherein the tool comprises a nail.

9. (original) The method of claim 1 wherein the tool comprises a roller.

10. (previously presented) A method of increasing a boundary layer strength of a workpiece consisting of ceramic comprising the steps of:

contacting the workpiece consisting of ceramic in which, the temperature has not been elevated above room temperature and does not comprise zirconia, with a tool having a predetermined diameter and has at least a partially rounded contour within a predetermined surface area, the tool comprising at least the same

order of hardness as the ceramic workpiece, said predetermined surface area being less than the total surface area of the ceramic workpiece and being selected based upon the composition of the workpiece;

wherein the predetermined diameter for the round contour tool does not exceed a critical value ranging from about .1 mm to about 4 mm, the critical value depending upon the composition of the ceramic workpiece selected such that upon contacting the ceramic workpiece with the round contour tool, generation of damage in the form of brittle fracture processes in the predetermined surface is substantially avoided and the boundary layer strength of the ceramic workpiece is increased.

11. (previously presented) The method of claim 10 wherein the critical value ranges from about .1 mm to about 1 mm.

12. (previously presented) The method of claim 10 wherein the tool has an inherent momentum and is directed onto the ceramic workpiece surface at rest, on which the boundary layer of the ceramic workpiece is deformed by introduction of the momentum of the tool.

13. (previously presented) The method of claim 10 wherein the ceramic workpiece surface is subjected to plastic deformation in a plurality of predetermined surface areas over the surface of the ceramic workpiece by repeated blows of the tool or by the application of a plurality of tools acting upon the ceramic workpiece surface.

14. (previously presented) The method of claim 10 wherein the tool comprises at least one sphere, which is driven onto the ceramic workpiece surface by means of a blasting installation, operated on compressed air or on an airless blasting means.

15. (previously presented) The method of claim 14 wherein the material of the sphere comprises the same or a similar material as that of the ceramic workpiece to be machined on its surface.

16. (original) The method of claim 10 wherein the tool comprises a hammer.

17. (original) The method of claim 10 wherein the tool comprises a nail.

18. (original) The method of claim 10 wherein the tool comprises a roller.

19. (cancelled)

(IX) Evidence Appendix

1. The Declaration of Mr. Hans-Wulf Pfeiffer ("the Declaration") that was previously entered pursuant to 37 CFR 1.132 is attached hereto at A. The Declaration was submitted by the Applicant in a Response to an Official Action of December 24, 2003 and was subsequently acknowledged and entered in the record in the Official Action dated October 24, 2004 at page 6, lines 12-18; and was subsequently addressed by the Examiner in the Official Action dated March 29, 2005 at page 6, lines 13-18.

(X) Related Proceedings Appendix

There are no decisions or pending related appeals and interferences per 37 CFR 41.37 (c)(1)(x).